1   COMPLETE LISTING OF CLAIMS

2   1. (Currently amended) A method comprising accessing virtual iSCSI storage, including the

3   steps of:

4   defining at least one physical logical unit number (LUN) on a physical storage device having an

5   device IP address;

6   associating a unique TCP port number with each said at least one physical LUN;

7   replacing a first LUN identifier specified in said iSCSI command with a second LUN identifier

8   associated with said given TCP port number;

9   establishing a unique IP address at which a virtual LUN is accessed from a host;

10   identifying a block TCP port number with each block range of said virtual LUN;

11   mapping a SCSI command to one or more iSCSI/TCP connections having said unique IP

12   address and the block TCP port number identified with said each block range referenced by said

13   SCSI command; and

14   substituting said unique IP address and said block TCP port number with said device IP address

15   and said given TCP port number on packets between said host and said storage devices,

16   wherein said step of accessing results in forming TCP/iSCSI connections between the host and

17   one or more physical LUNs without terminating said TCP/iSCSI connection at an intermediate

18   gateway between said host and said device.

DOCKET NUMBER: YOR920020015US1   -3/13-

1   2. (Original)   A method as recited in claim 1, further comprising forming a correspondence

2   between an iSCSI command received on a given TCP port with a particular physical LUN

3   associated with said given TCP port.

4   3. (Canceled)

5   4. (Original) A method as recited in claim 1, wherein the step of mapping includes converting a

6   single SCSI command to one iSCSI connection per block range accessed.

7   5. (Original) A method as recited in claim 1, wherein the step of substituting includes looking up

8   a local substitution map at a gateway having a mapping between incoming destination IP address

9   and port number and an outgoing device IP address and port number.

10   6. (Original)   A method as recited in claim 1, where a migration of a physical LUN from a

11   source storage device to a target storage device requires only updating said substitution map to

12   reflect new location of said physical LUN.

13   7. (Original) A method as recited in claim 1, further comprising:

14   employing IPSec processing support at the host;

15   employing IPSec processing support at a gateway between said host and said storage device; and

16   forming an IPSec tunnel between said host and said gateway;

17   10. (Currently amended) A method comprising providing support at a physical storage device for

18   accessing virtual iSCSI storage, including the steps of:

19   defining at least one physical logical unit (LUN) on the physical storage device having an device

20   IP address;

DOCKET NUMBER: YOR920020015US1   **-4/13-**

1   associating a unique TCP port number with each said at least one physical LUN; and

2   replacing a first LUN identifier specified in said iSCSI command with a second LUN identifier
3   associated with said given TCP port number,

4   wherein said step of accessing results in forming TCP/iSCSI connections between the host and
5   one or more physical LUNs without terminating said TCP/iSCSI connection at an intermediate
6   gateway between said host and said device.

7   11. (Currently amended) A method comprising providing support at a host for accessing virtual
8   iSCSI storage, including the steps of:

9   establishing a unique IP address at which a virtual LUN is accessed from the host;

10   identifying a block TCP port number with each block range of said virtual LUN; and

11   mapping a SCSI command to one or more iSCSI/TCP connections having said unique IP
12   address and the block TCP port number identified with said each block range referenced by said
13   SCSI command;

14   wherein said step of establishing results in forming TCP/iSCSI connections between the host and
15   one or more physical LUNs without terminating said TCP/iSCSI connection at an intermediate
16   gateway between said host and said device.

17   12. (Currently amended) A method comprising providing support at an intermediate gateway
18   device between a host and a storage device for accessing virtual iSCSI storage, including the step
19   of substituting a host-specified IP address and a host-specified TCP port number with a device IP

DOCKET NUMBER: YOR920020015US1   **-5/13-**

1   address and a TCP port number within that device according to a substitution table describing the
2   virtual to physical storage mapping for incoming packets before forwarding said packets.

3   wherein said step of accessing results in forming TCP/iSCSI connections between the host and
4   one or more physical LUNs without terminating said TCP/iSCSI connection at an intermediate
5   gateway between said host and said device.

6   13. (Currently amended) An apparatus comprising:

7   a conversion module at a physical storage device for accessing virtual iSCSI storage, coupled to
8   means for defining at least one physical logical unit (LUN) on the physical storage device having
9   an device IP address; and coupled to means for associating a unique TCP port number with each
10 said at least one physical LUN; said conversion module to replace a first LUN identifier
11 specified in said iSCSI command with a second LUN identifier associated with said given TCP
12 port number.

13 wherein said conversion module access results in forming TCP/iSCSI connections between the
14 host and one or more physical LUNs without terminating said TCP/iSCSI connection at an
15 intermediate gateway between said host and said device.

16 14. (Currently amended) An apparatus at a physical storage device for accessing virtual iSCSI
17 storage, comprising:

18 means for replacing a first LUN identifier specified in an iSCSI command with a second LUN
19 identifier associated with a given TCP port number included in said iSCSI command;

20 means for defining at least one physical logical unit (LUN) on the physical storage device having
21 an device IP address; and

22 means for associating a unique TCP port number with each said at least one physical LUN,

DOCKET NUMBER: YOR920020015US1   **-6/13-**

1   wherein access of virtual iSCSI storage results in forming TCP/iSCSI connections between the

2   host and one or more physical LUNs without terminating said TCP/iSCSI connection at an

3   intermediate gateway between said host and said device.

4   15. (Currently amended) An apparatus comprising a virtualization module at a host for accessing

5   virtual iSCSI storage, said virtualization module includes:

6   means for establishing a unique IP address at which a virtual LUN is accessed from the host;

7   means for identifying a block TCP port number with each block range of said virtual LUN; and

8   means for mapping a SCSI command to one or more iSCSI/TCP connections having said

9   unique IP address and the block TCP port number identified with said each block range

10   referenced by said SCSI command,

11   wherein access of virtual iSCSI storage results in forming TCP/iSCSI connections between the

12   host and one or more physical LUNs without terminating said TCP/iSCSI connection at an

13   intermediate gateway between said host and said device.

14   16. (Currently amended) An apparatus comprising a virtualization module at a host for accessing

15   virtual iSCSI storage, said virtualization module includes:

16   a control module establishing a unique IP address at which a virtual LUN is accessed from the

17   host, and for identifying a block TCP port number with each block range of said virtual LUN;

18   and

19   a driver module for mapping a SCSI command to one or more iSCSI/TCP connections having

20   said unique IP address and the block TCP port number identified with said each block range

21   referenced by said SCSI command,

DOCKET NUMBER: YOR920020015US1   -7/13-

1   wherein access of virtual iSCSI storage results in forming TCP/iSCSI connections between the

2   host and one or more physical LUNs without terminating said TCP/iSCSI connection at an

3   intermediate gateway between said host and said device.

4   17. (Currently amended) An apparatus comprising:

5   an address translation module at an intermediate gateway device between a host and a storage

6   device for accessing virtual iSCSI storage, said address translation module having a substitution

7   table describing a virtual to physical storage mapping, said address translation module to replace

8   a host-specified IP address and a host-specified TCP port number with a device IP address and a

9   TCP port number within said intermediate gateway device according to the substitution table for

10   incoming packets before forwarding said incoming packets.

11   wherein access of virtual iSCSI storage results in forming TCP/iSCSI connections between the

12   host and one or more physical LUNs without terminating said TCP/iSCSI connection at an

13   intermediate gateway between said host and said device.

14   18. (Currently amended) An apparatus comprising:

15   means for accessing, said apparatus being at an intermediate gateway device between a host and a

16   storage device for accessing virtual iSCSI storage, said intermediate gateway device having a a

17   substitution table, said substitution table describing a virtual to physical storage mapping of IP

18   addresses and TCP port numbers; said apparatus comprising:

19   means for replacing a host-specified IP address and a host-specified TCP port number, with an

20   IP address and a TCP port number of the storage device, within said intermediate gateway

21   device, according to the substitution table for incoming packets before forwarding said incoming

22   packets.

DOCKET NUMBER: YOR920020015US1   **-8/13-**

1   wherein access of virtual iSCSI storage results in forming TCP/iSCSI connections between the

2   host and one or more physical LUNs without terminating said TCP/iSCSI connection at an

3   intermediate gateway between said host and said device.

4   19. (Original) An article of manufacture comprising a computer usable medium having

5   computer readable program code means embodied therein for causing accessing virtual iSCSI

6   storage,, the computer readable program code means in said article of manufacture comprising

7   computer readable program code means for causing a computer to effect the steps of claim 1.

8   20. (Original) A program storage device readable by machine, tangibly embodying a program of

9   instructions executable by the machine to perform method steps for accessing virtual iSCSI

10   storage,, said method steps comprising the steps of claim 1..

11   21. (Original) A computer program product comprising a computer usable medium having

12   computer readable program code means embodied therein for causing LUN identifier

13   substitution, the computer readable program code means in said computer program product

14   comprising computer readable program code means for causing a computer to effect the

15   functions of claim 13.

16   22. (Original) A computer program product comprising a computer usable medium having

17   computer readable program code means embodied therein for causing LUN identifier

18   substitution, the computer readable program code means in said computer program product

19   comprising computer readable program code means for causing a computer to effect the

20   functions of claim 14.

21   23. (Original) A computer program product comprising a computer usable medium having

22   computer readable program code means embodied therein for causing SCSI command mapping,

23   the computer readable program code means in said computer program product comprising

24   computer readable program code means for causing a computer to effect the functions of claim

25   15.

1   24. (Original) A computer program product comprising a computer usable medium having

2   computer readable program code means embodied therein for causing SCSI command mapping,

3   the computer readable program code means in said computer program product comprising

4   computer readable program code means for causing a computer to effect the functions of claim

5   16.

6   25. (Original) A computer program product comprising a computer usable medium having

7   computer readable program code means embodied therein for causing address substitution, the

8   computer readable program code means in said computer program product comprising computer

9   readable program code means for causing a computer to effect the functions of claim 17.

10   26. (Original) A computer program product comprising a computer usable medium having

11   computer readable program code means embodied therein for causing address substitution, the

12   computer readable program code means in said computer program product comprising computer

13   readable program code means for causing a computer to effect the functions of claim 18.

DOCKET NUMBER: YOR920020015US1   **-10/13-**